

1 **CLAIMS**

2 What is claimed is:

3 1. A method for allocating resources of one or more
4 programmable logic devices (PLDs) to a plurality of
5 functions in a system having one or more PLDs on which the
6 functions are implemented, comprising:

7 monitoring activity levels of the functions;

8 detecting when the activity level of a first function
9 is decreasing;

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10 selecting a subset of PLD resources that implement the
11 first function;12 selecting a configuration bitstream for implementing a
13 second function; and14 reconfiguring the subset of PLD resources implementing
15 the first function with the configuration bitstream of the
16 second function.

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18 2. The method of claim 1, further comprising periodically
19 sampling the activity levels of the functions.

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21 3. The method of claim 2, further comprising determining
22 whether the activity level of the first function is
23 decreasing after the steps of sampling the activity levels
24 of the functions a selected number of times.

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26 4. The method of claim 1, further comprising:

27 detecting when the activity levels of the second and a
28 third function are increasing;29 allocating the subset of PLD resources between the
30 second and third functions in proportion to a ratio of
31 increasing activity levels between the second and third
32 functions;33 selecting a configuration bitstream for implementing a
34 third function, wherein the configuration bitstreams for
35 implementing the second and third functions proportionally

1 allocate the subset of PLD resources in proportion to the
2 ratio of increasing activity levels; and
3 reconfiguring the subset of PLD resources with the
4 configuration bitstreams of the second and third function.

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6 5. The method of claim 1, further comprising:

7 wherein the subset of PLD resources implementing the
8 first function is reconfigured with the configuration
9 bitstream of the second function only if the activity level
10 of the second function is increasing; and

11 if none of the functions have increasing activity
12 levels, then reconfiguring the subset of PLD resources with
13 a predetermined configuration bitstream and adding the
14 subset of PLD resources to a reserve of PLD resources.

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16 6. The method of claim 5, further comprising, if none of
17 the functions have decreasing activity levels, then
18 detecting whether any of the functions have increasing
19 activity levels, and for functions having increasing
20 activity levels, allocating a subset of PLD resources from
21 the reserve of PLD resources to the functions having
22 increasing activity levels and reconfiguring the subset of
23 PLD resources from the reserve of PLD resources with
24 configuration bitstreams that implement the functions having
25 increasing activity levels.

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27 7. The method of claim 6, wherein the configuration
28 bitstreams for implementing the functions having increasing
29 activity levels proportionally allocate the subset of PLD
30 resources from the reserve in proportion to a ratio of
31 increasing activity levels.

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33 8. A method for allocating resources of one or more
34 programmable logic devices (PLDs) to a plurality of
35 functions in a system having one or more PLDs on which the
36 functions are implemented, comprising:

1 allocating a first portion of total PLD resources to a
2 reserve of PLD resources and a second portion of PLD
3 resources to the plurality of functions;

4 configuring the second portion of PLD resources with
5 configuration bitstreams that implement the plurality of
6 functions, wherein the second portion of PLD resources are
7 allocated between the functions in a selected ratio;

8 monitoring activity levels of the functions; and

9 if the activity level of a first function is decreasing
10 and the activity levels of one or more other functions are
11 increasing, then selecting a subset of PLD resources that
12 implement the first function and reconfiguring the subset of
13 PLD resources with one or more configuration bitstreams that
14 implement the one or more other functions, wherein the
15 configuration bitstreams for implementing the functions
16 having increasing activity levels proportionally allocate
17 the subset of PLD resources from the first function in
18 proportion to a ratio of increasing activity levels.

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20 9. The method of claim 8, further comprising:

21 if none of the functions has a decreasing activity
22 level and the activity levels of one or more other functions
23 are increasing, then selecting a subset of PLD resources
24 from the reserve of PLD resources and reconfiguring the
25 subset of PLD resources from the reserve with one or more
26 configuration bitstreams that implement the one or more
27 other functions, wherein the configuration bitstreams for
28 implementing the functions having increasing activity levels
29 proportionally allocate the subset of PLD resources from the
30 reserve in proportion to a ratio of increasing activity
31 levels.

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33 10. The method of claim 9, further comprising:

34 periodically sampling the activity levels of the
35 functions; and

1 wherein the activity level of the first function is
2 considered to be decreasing if sampled activity levels over
3 a selected period of time are less than a selected
4 threshold.

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6 11. The method of claim 10, wherein the activity level of a
7 function is considered to be increasing if sampled activity
8 levels over a selected period of time are greater than a
9 selected threshold.

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11 12. The method of claim 8, further comprising:
12 periodically sampling the activity levels of the
13 functions; and

14 wherein the activity level of the first function is
15 considered to be decreasing if sampled activity levels over
16 a selected period of time are less than a selected
17 threshold.

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19 13. A reconfigurable system comprising:
20 a plurality of programmable logic devices (PLDs);
21 a storage element coupled to the PLDs and having stored
22 therein a plurality of configuration bitstreams, wherein
23 each configuration bitstream implements a different
24 function;

25 a load monitor coupled to the PLDs, wherein the load
26 monitor is configured and arranged to monitor respective
27 activity levels of the functions implemented on the PLDs,
28 select a subset of PLD resources for reconfiguration, and
29 generate allocation signals for reconfiguring the subset of
30 PLD resources proportional to the respective activity
31 levels; and

32 a configuration control element coupled to the load
33 monitor, the PLDs, and the storage element, the
34 configuration control element configured and arranged to
35 reconfigure the PLDs with the configuration bitstreams
36 responsive to the allocation signals.

